

## AMENDMENTS TO THE CLAIMS

Claim 1 (Previously presented) An extrusion-free wet cleaning  
5 process for post-etch Cu-dual damascene structures, the process  
comprising:

providing a wafer comprising a silicon substrate and at least  
one post-etch Cu-dual damascene structure, the post-etch  
Cu-dual damascene structure having a via structure exposing  
10 a portion of a Cu wiring line electrically connected with  
an N<sup>+</sup> diffusion region of the silicon substrate and a trench  
structure formed on the via structure;

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executing an oxidation step by applying a diluted H<sub>2</sub>O<sub>2</sub> solution  
to the wafer to slightly oxidize the surface of the exposed  
15 Cu wiring line; and

washing away cupric oxide generated in the oxidation step  
by means of a cupric oxide cleaning solution containing  
diluted HF, NH<sub>4</sub>F or NH<sub>2</sub>OH having a pH of above 7.

20 Claim 2 (Original) The process of claim 1 wherein the Cu wiring  
line electrically connected with an N<sup>+</sup> diffusion region of  
the silicon substrate serves as a cathode in the cupric oxide  
cleaning solution.

25 Claim 3 (Original) The process of claim 1 wherein the method of  
preventing Cu reduction reactions on the Cu wiring line  
comprises purging inert gas onto the wafer during the  
application to the wafer of the diluted H<sub>2</sub>O<sub>2</sub> solution.

30 Claim 4 (Original) The process of claim 1 wherein the method of

preventing Cu reduction reactions on the Cu wiring line comprises adding a Cu corrosion inhibitor to the diluted H<sub>2</sub>O<sub>2</sub> solution.

5    Claim 5 (Original) The process of claim 4 wherein the Cu corrosion inhibitor comprises benzotriazole (BTA).

10    Claim 6 (Previously presented) The process of claim 1 wherein the method of preventing Cu reduction reactions on the Cu wiring line comprises reducing the H<sub>2</sub>O<sub>2</sub> concentration of the diluted H<sub>2</sub>O<sub>2</sub> solution to below 100:1 (v/v) of solvent to H<sub>2</sub>O<sub>2</sub>.

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15    ~~Claim 7 (Original) The process of claim 1 wherein the method of preventing Cu reduction reactions on the Cu wiring line comprises lowering the temperature of the diluted H<sub>2</sub>O<sub>2</sub> solution to below 15°C during the application to the wafer of the diluted H<sub>2</sub>O<sub>2</sub> solution.~~

20    Claim 8 (Cancelled)

25    Claim 9 (Currently amended) A wet cleaning process comprising:  
an oxidation step ~~comprising~~ incorporated with a means for reducing Cu deposition on a cathode-like copper wiring line of a Cu-dual damascene structure, wherein the means  
30    for reducing Cu deposition on a cathode-like copper wiring line comprises a step of purging an inert gas during the oxidation process; and  
an oxide etch step for washing away cupric oxide generated in the oxidation step by means of a cupric oxide cleaning solution.

Claim 10 (Original) The process of claim 9 wherein the oxidation  
step is used to slightly oxidize a surface of a Cu wiring  
line in a dual damascene structure by utilizing a diluted  
5  $H_2O_2$  solution.

Claim 11 (Original) The process of claim 9 wherein the cupric  
oxide cleaning solution comprises diluted HF,  $NH_4F$ ,  $NH_2OH$ ,  
or diluted HF/HCl.

10 Claim 12 (Original) The process of claim 9 wherein the oxide  
generated in the oxidation step comprises  $Cu_2O$  and  $Cu(OH)_2$ .

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15 Claim 13 (Original) The process of claim 9 wherein the cathode-like  
copper wiring line is electrically connected with an N  
diffusion region of a silicon substrate.

Claim 14 (Cancelled)

20 Claim 15 (Original) The process of claim 9 wherein the process  
of reducing Cu deposition on a cathode-like copper wiring  
line comprises adding a Cu corrosion inhibitor to the diluted  
 $H_2O_2$  solution.

25 Claim 16 (Original) The process of claim 15 wherein the Cu corrosion  
inhibitor comprises benzotriazole (BTA).

30 Claim 17 (Previously presented) The process of claim 9 wherein  
the process of reducing Cu deposition on a cathode-like copper  
wiring line comprises reducing the  $H_2O_2$  concentration of the

diluted  $\text{H}_2\text{O}_2$  solution to below 100:1 (v/v) of solvent to  $\text{H}_2\text{O}_2$ .

5      Claim 18 (Original) The process of claim 9 wherein the process  
of reducing Cu deposition on a cathode-like copper wiring  
line comprises lowering the temperature of the diluted  $\text{H}_2\text{O}_2$   
solution during the oxidation step to below  $15^\circ\text{C}$ .

10      Claim 19 (Original) The process of claim 9 wherein the process  
of reducing Cu deposition on a cathode-like copper wiring  
line comprises increasing the pH of the cupric oxide cleaning  
solution to above 7.

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